Epidemiological Update Dengue in the Region of the Americas

28 March 2023

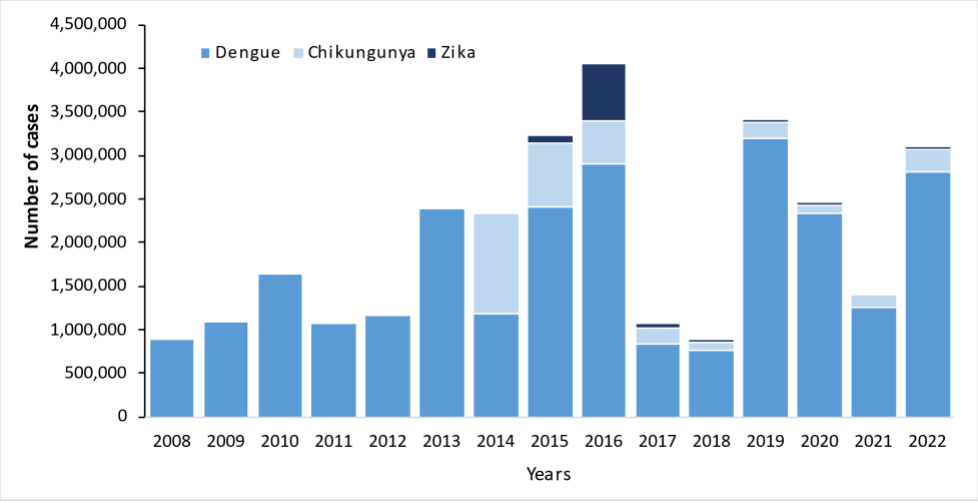
In 2022, the Region of the Americas an increase in the number of cases and deaths due to dengue was observed compared to the previous years. This trend has continued during the first weeks of 2023, and in some countries, it has become even more pronounced, resulting in overburdening of health care services. Given this situation, the Pan American Health Organization / World Health Organization (PAHO/WHO) reiterates to Member States to organize the health care service networks and strengthen health care services, while reinforcing individual and vector prevention and control measures to reduce the impact on the population.

Situation summary

In the Region of the Americas, between epidemiological week (EW) 1 and EW 52 of 2022, there were 2,809,818 dengue cases reported, with a cumulative incidence rate of 282.96 cases per 100,000 population. As of EW 10 of 2023, dengue continues to be the predominant arboviral disease, representing 75% (342,243) of all the arbovirus cases *(1)*.

In **Figure 1** a temporal decrease in dengue, chikungunya, and Zika cases over the last 15 years in the Region of the Americas can be observed, with a clear predominance of dengue circulation over other arboviruses. The third year with highest number of dengue cases reported was in 2022, only being surpassed in numbers reported in the years 2016 and 2019.

Figure 1. Distribution of dengue, chikungunya, and Zika cases by year reported. Region of the Americas, 2008-2022 (up to EW 52 of 2022).



Source: Adapted from Pan American Health Organization. PLISA Health Information Platform for the Americas, Core Indicators Portal. Washington, DC: PAHO; 2023 [cited 14 March 2023]. Available from: https://bit.ly/3F5JFEg

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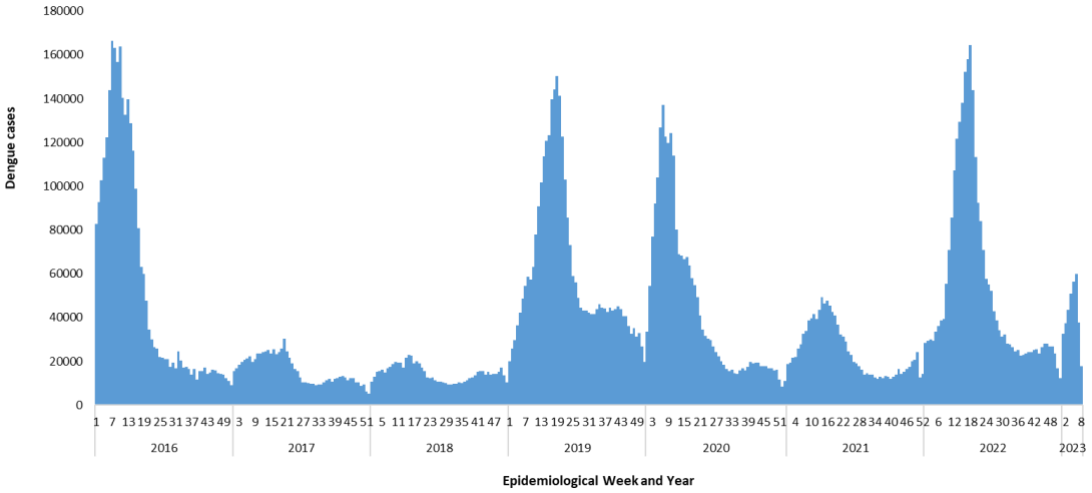
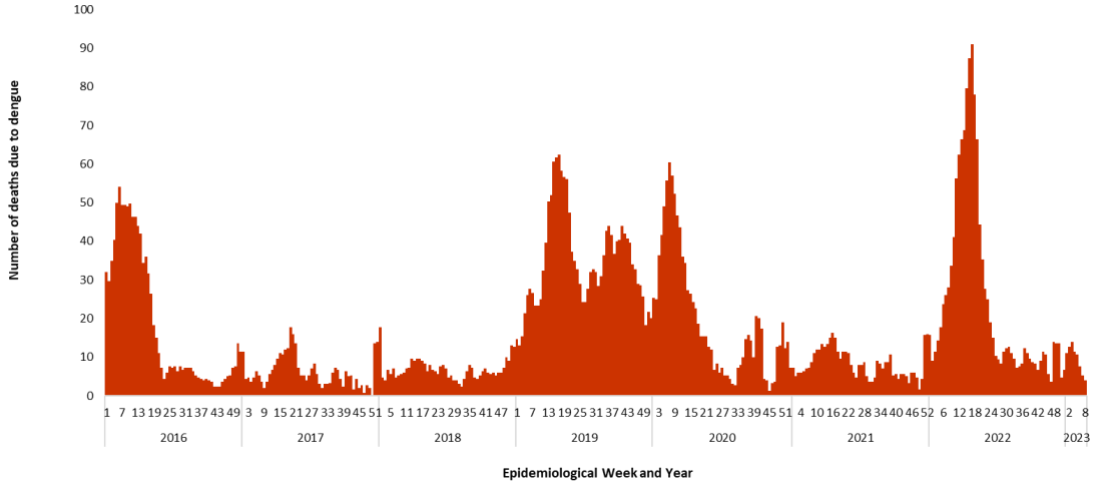
In 2019, the largest number of dengue cases was recorded with over 3.1 million cases (**Figure 2**), including 28,203 severe cases, and 1,823 deaths *(1)* (**Figure 3**).

Figure 2. Distribution of dengue cases by epidemiological week of report. Region of the Americas, 2016-2023 (until EW 8 of 2023).



Source: Adapted from Pan American Health Organization. PLISA Health Information Platform for the Americas, Core Indicators Portal. Washington, DC: PAHO; 2023 [cited 14 March 2023]. Available from: https://bit.ly/3F5JFEg

Figure 3. Distribution of deaths due to dengue by epidemiological week of report. Region of the Americas, 2016-2023 (until EW 8 of 2023).



Source: Adapted from Pan American Health Organization. PLISA Health Information Platform for the Americas, Core Indicators Portal. Washington, DC: PAHO; 2023 [cited 14 March 2023]. Available from: https://bit.ly/3F5JFEg

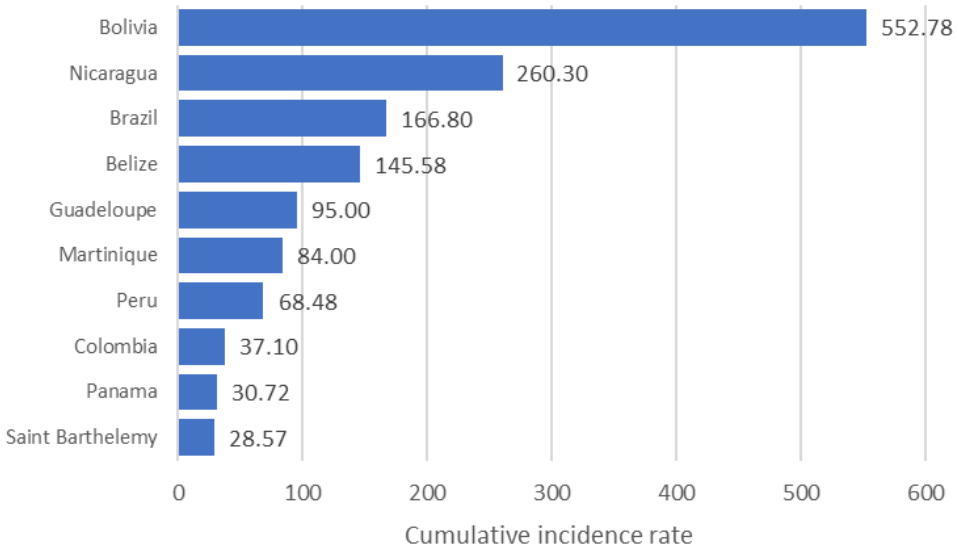
In 2023, between EW 1 and EW 10, there were 393,185 dengue cases reported in the Region of the Americas, while for the same period in 2022, there were 390,733 cases reported. The highest cumulative incidences were reported in the following subregions[1]: Southern Cone with 84.65 cases per 100,000 population, Andean Subregion with 78.55 cases per 100,000 population, and the Central

[1] Note: The subregions, countries, and territories are divided as reflected in the Pan American Health Organization. PLISA Health Information Platform for the Americas, Core Indicators Portal. Washington, DC: PAHO; 2023 [cited 27 March 2023]. Available from: https://bit.ly/3F5JFEg

American Isthmus and Mexico with 18.77 cases per 100,000 population. In the Andean Subregion and in the Central American Isthmus and Mexico Subregion, there is an increase in the accumulated incidence compared to the same period in 2022 *(1)*.

When analyzing the cumulative incidences by country and territory of the Region of the Americas, between EW 1 and EW 10 of 2023, the 4 countries with the highest cumulative incidence rates were Bolivia (552.78 cases per 100,000 population) *(1)*, Nicaragua (260.30 cases per 100,000 population) *(2)*, Belize (145.58 cases per 100,000 population) *(1)*, and Brazil (166.8 cases per 100,000 population) *(3)* (**Figure 4**). All the mentioned countries increased their cumulative incidence compared to the same period in 2022. The cumulative incidence increase of dengue cases in Bolivia is around 23 times greater than that reported in the same period of 2022.

Figure 4. Dengue cumulative incidence rate (per 100,000 population) by country and territory of the Region of the Americas 2023 (EW 1 to EW 10 of 2023).



Sources: Adapted from: Pan American Health Organization. PLISA Health Information Platform for the Americas, Core Indicators Portal. Washington, DC: PAHO; 2023 [cited 27 March 2023]. Available from: https://bit.ly/3F5JFEg; Nicaragua International Health Regulations (IHR) National Focal Point (NFP). 22 March 2023 email report. Managua; 2023. Unpublished.; and Brazil International Health Regulations (IHR) National Focal Point (NFP). 22 March 2023 email report. Brasilia; 2023. Unpublished.

In 2023, as of EW 10, the highest number of severe dengue cases were reported in: Colombia with 284 cases *(1)*, Brazil with 231 cases *(3)*, and Peru with 71 cases *(1)*. Additionally, during the same period, there were 114 dengue related deaths in the Region of the Americas (case fatality rate [CFR] of 0.029 %) *(1)*.

Following is a summary of the epidemiological situation of dengue by subregion and countries with the highest cumulative incidence rates in 2023.

Southern Cone[2]

In the Southern Cone, between EW 1 and EW 10 of 2023 there were 245,282 dengue cases reported with a cumulative incidence of 84.65 cases per 100,000 population, including 43 severe dengue cases and 26 deaths. The case fatality rate was 0.01 %. During the same period this subregion

[2] Argentina, Brazil, Chile, Paraguay, and Uruguay

recorded the largest number of dengue cases in the Region of the Americas, equal to the numbers recorded in the same subregion in 2022 *(1)*.

In 2023, as of EW 10, the countries with the highest dengue cumulative incidence rates in this subregion were: ***Brazil*** (166.8 cases per 100,000 population) *(3)*, **Argentina** (20.4 cases per 100,000 population) *(4)*, and ***Paraguay*** (4 cases per 100,000 population) *(5)*.

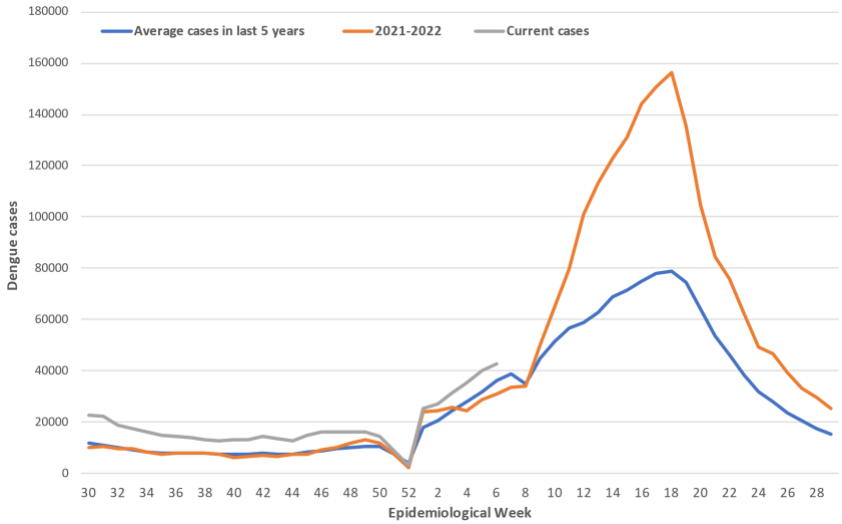
Brazil (3)

Between EW 1 and EW 11 of 2023, there were 385,131 dengue cases reported in Brazil, representing an increase of around 45% cases compared to the same period of 2022 (**Figure 5**). The highest cumulative incidence in Brazil was reported in 2015, with 436,743 probable cases reported and 307 deaths as of EW 10.

Of the total cases reported up to EW 10 de 2023, 103,315 were confirmed by laboratory, 231 cases were classified as severe dengue, including 105 deaths. The confirmed cases were reported in the 27 Federal Units, 62.9% were reported among the following three states: Minas Gerais (30%; 106,849 cases, including 13 deaths), São Paulo (21.5%; 76,425 cases, including 44 deaths), and Espírito Santo (11.4%; 40,764 cases, including 15 deaths). As of EW 8 of 2023, the circulation of serotypes dengue virus type 1 (DENV 1) and dengue virus type 2 (DENV 2) was reported, while in the same period of 2022, circulation of DENV 1, DENV 2 and dengue virus type 4 (DENV 4) had been reported.

The states of Santa Catarina, Paraná, and Río Grande do Sul have reported dengue cases since EW 1 of 2023 and as of EW 10 of 2023, 34,715 probable cases were reported among them, representing a relative increase of 45% since the same period in 2022.

Figure 5. Dengue cases reported by epidemiological week in Brazil: average number of cases of the last 5 years, the 2021-2022 season, and the current outbreak (until EW 6 of 2023).



Source: Adapted from Pan American Health Organization. PLISA Health Information Platform for the Americas, Core Indicators Portal. Washington, DC: PAHO; 2023 [cited 14 March 2023]. Available from: https://bit.ly/3F5JFEg

Argentina (4)

Between EW 1 and EW 11 of 2023, there were 9,388 dengue cases in Argentina, representing nearly a 100-fold increase compared to the same period of 2022 when 95 cases were reported. In Argentina, the highest cumulative incidence of dengue was reported in 2020, with 59,723 cases reported. Of the cases reported up to EW 11 of 2023, 6,481 were confirmed by laboratory, four were classified as severe dengue, and three deaths were reported. The confirmed cases during this period were reported in 22 of the 24 provinces, of which 13 report viral circulation. As of EW 11 of 2023 the serotypes DENV1 and DENV 2 were circulating, the same as in 2022.

Paraguay (5)
Between EW 1 and EW 10 of 2023 there were 791 dengue cases reported in Paraguay. The cumulative incidence rate was the highest in 2020 (EW 1 to EW 52), when 173,284 dengue cases were reported (confirmed and probable); 165,378 were reported between EW 1 and EW 10 of 2020. Of the total dengue cases reported up to EW 10 of 2023, 791 were confirmed by laboratory, none were classified as severe dengue, and no deaths were reported. The confirmed cases were reported in 18 of the sanitary regions of the country, 53% were reported among the following three: Amambay (20%; 157 cases), Central (20%; 167 cases), and Asunción (13%; 101 cases). As of EW 10 of 2023, the circulation of DENV 1 and DENV 2 serotypes was reported, the same as in 2022.

Central American Isthmus and Mexico[3]

In 2023, as of EW 9, the countries with the highest cumulative incidence in the Central American Isthmus and Mexico subregion are: ***Nicaragua*** (260.30 cases per 100,000 population) *(2)*, **Belize** (145.58 cases per 100,000 population) *(1)*, and ***Panama*** (30.72 cases per 100,000 population).

Nicaragua (2)
In 2023, up to EW 7, there were 13,502 dengue suspected cases reported, 319 (2.36%) were confirmed by laboratory, 2 were classified as severe dengue and no deaths were reported. This represents a nearly double increase of cases compared to the same period in 2022.

Andean subregion[4]

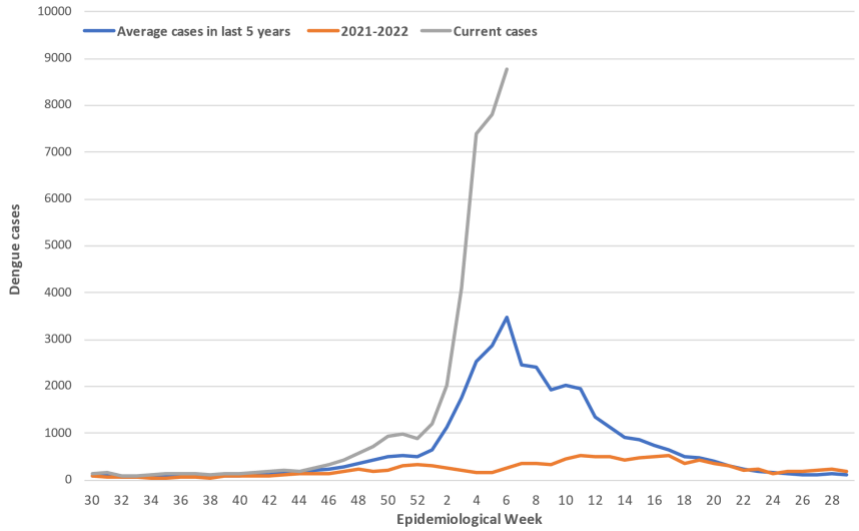
Between EW 1 and EW 9 of 2023, there were 99,044 dengue cases with a cumulative incidence rate of 69.24 cases per 100,000 population in this subregion, including 534 severe dengue cases and 79 deaths (62% of the deaths were reported in Bolivia, while 33% were in Peru) *(1)*. The case fatality rate is 0.08% *(1)*. In the same period of 2022, there were 27,610 cases reported with 25 deaths *(1)*.

The countries with the highest cumulative incidence in this subregion were: ***Bolivia*** (476.24 cases per 100,000 population) *(1)*, ***Peru*** (61.37 cases per 100,000 population) *(1)*, and ***Colombia*** (33.71 cases per 100,000 population) *(1)*.

Bolivia[5] (1)
Between EW 1 and EW 9 of 2023, there were 56,353 dengue cases reported in Bolivia, representing 24-fold increase compared to the same period of 2022 (**Figure 6**). In 2020 the dengue cumulative incidence was the highest in Bolivia, with 111,347 cases. Of the cases reported up to EW 9 of 2023, 14,094 were confirmed by laboratory, including 199 cases classified as severe dengue, and 49 deaths. The case fatality rate in 2022 was 0.084%, lower than that observed in 2023 (0.087%) for the same period. As of EW 9 of 2023, the serotype DENV 2 was identified as circulating, while in 2019 to 2022, the serotypes DENV 1 and DENV 2 had been cocirculating.

Figure 6. Dengue cases reported by epidemiological week (EW) in Bolivia: average number of cases of the last 5 years, the 2021-2020 season, and the current outbreak (until EW 6 of 2023).

[3] Belize, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, and Panama
[4] Bolivia, Colombia, Ecuador, Peru, and Bolivarian Republic of Venezuela
[5] Plurinational State of Bolivia

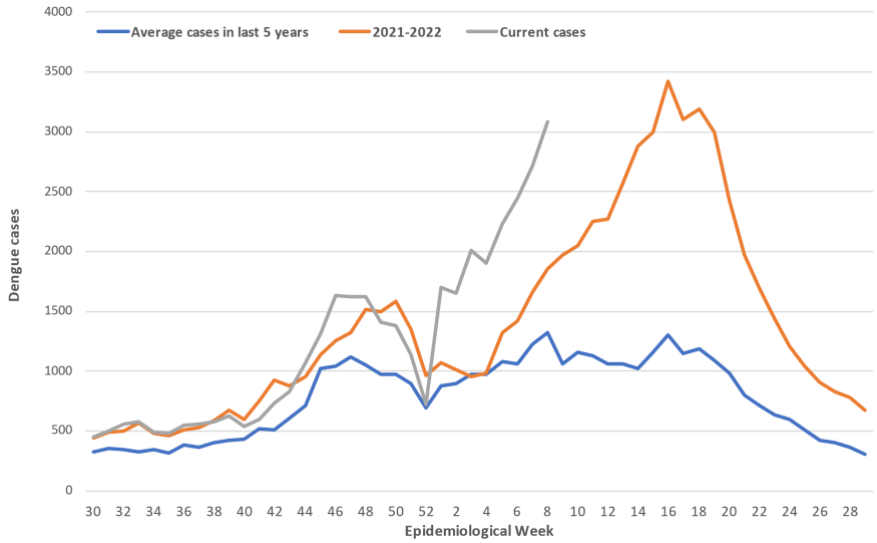


Source: Adapted from Pan American Health Organization. PLISA Health Information Platform for the Americas, Core Indicators Portal. Washington, DC: PAHO; 2023 [cited 14 March 2023]. Available from: https://bit.ly/3F5JFEq

Peru (6)

In 2023, as of EW 9, there were 20,017 dengue cases reported, 10,200 (51%) were laboratory confirmed, 80 were classified as severe dengue, and there were 25 deaths (case fatality rate [CFR] of 0.13%). The serotypes DENV 1, DENV 2 and dengue virus type 3 (DENV 3) were identified, in contrast to 2022 when only DENV 1 and DENV 2 were identified. Compared to the same period in 2022, there were 8,311 more cases (**Figure 7**) and the same number of deaths. **Figure 7** shows that the current outbreak started about four epidemiological weeks earlier compared to beginning in prior years.

Figure 7. Dengue cases reported by epidemiological week (EW) in Peru: average number of cases of the last 5 years, the 2021-2022 season, and the current outbreak (until EW 8 of 2023).



Source: Adapted from Pan American Health Organization. PLISA Health Information Platform for the Americas, Core Indicators Portal. Washington, DC: PAHO; 2023 [cited 14 March 2023]. Available from: https://bit.ly/3F5JFEq

Colombia (7)

Between EW 1 and EW 9 of 2023, there were 17,283 dengue cases in Colombia, representing an 86.8% increase compared to the cases reported for the same period of 2022, being 9,251 cases. Of the reported cases, 8,300 were confirmed by laboratory, 256 were classified as severe dengue, and there were two confirmed deaths. The confirmed cases were reported in 100% (37/37) of the territorial entities of Colombia, with 30% reported among the following three: Barranquilla (13.8%: 1,142 cases), Atlántico (8.6%: 715 cases), and La Guajira (8.2%: 681 cases). As of EW 9 of 2023 the serotypes DENV1, DENV2, DENV3, and DENV4 were circulating, similar to that reported in 2022 when all four DENV serotypes were observed as circulating *(7)*.

Latin Caribbean[6]

Between EW 1 and EW 9 of 2023, in the Latin Caribbean areas considered there were 528 dengue cases reported with a cumulative incidence rate of 3.83 cases per 100,000 population, including 11 severe dengue cases, and two deaths. The case fatality rate was 0.38%. Compared to the same period in 2022, there was a decrease of about 200 cases and 6 deaths.

In 2023, as of EW 9, the countries and territories with the highest cumulative incidence rate in this subregion were: **Puerto Rico** (6.58 cases per 100,000 population) *(1)* and the ***Dominican Republic*** (3.12 cases per 100,000 population) *(1)*.

Guidance for national authorities

Since 2022 and including the first quarter of 2023, following almost 2 years with relatively few dengue cases reported in the Region of the Americas, the health care services in this Region once again face an increase in dengue cases, and in some countries with a concomitant increase in other pathologies including COVID-19. The Pan American Health Organization / World Health Organization (PAHO / WHO) urges Member States to review and adjust their protocols for surveillance, triage, diagnosis and timely and adequate treatment during the occurrence of outbreaks caused by arboviruses and COVID-19. 19. Simultaneously, Member States are urged to strengthen risk communication to increase dengue patients' awareness of warning signs so they seek timely medical care from health care services. PAHO/WHO recommends proper triage of patients both for the timely detection of dengue warning signs and to reduce the possible risk of SARS-CoV-2 infections that can be acquired in health care services at times of mass patient influx.

Early identification and management of cases with warning signs will reduce the number of dengue cases requiring hospitalization, alleviating the additional burden on more complex levels of care that also provide care for severe cases of COVID-19 infection.

Integrated Surveillance

PAHO/WHO encourages continued epidemiological surveillance and sharing reports of suspected and confirmed dengue cases.

Given that the clustering of cases is common in both diseases (dengue and COVID-19), efforts should be made to analyze the spatial distribution of cases to allow a rapid response at the local levels of the most affected areas.

Sentinel entomological surveillance assist with assessing changes in the risk of vector-borne diseases and the impact of vector control measures.

[6] Cuba, the Dominican Republic, and Puerto Rico

Laboratory diagnosis

Laboratory diagnosis of dengue infection is based on virological (RT-PCR, NS1 antigen detection, viral isolation in culture) and serological (IgM detection) tests; however, for the confirmation of cases, priority should be given to virological tests that demonstrate the presence of the virus, its genetic material or its proteins. In general, virological assays for dengue are performed on serum samples taken during the first 5 days after the onset of symptoms (acute phase), although highly sensitive molecular methodologies can detect viral RNA for up to 7 days depending on the viraemia.

On the other hand, serological assays based on the detection of IgM (or IgG) must be carefully analyzed, taking into account the time that antibodies circulate in the blood after an infection, as well as the possibility of cross-reaction with other flaviviruses (including Zika, yellow fever, and others) and non-specific detection. Thus, a single IgM result in a patient only indicates possible recent contact with the virus, but contact may have occurred up to 6 months ago. A second sample taken at least one week apart, processed in parallel with the first and with a quantitative serological assay (PRNT, for example) that can demonstrate seroconversion or increased antibody titer, may be useful to clarify the diagnosis.

In fatal cases, tissue samples (liver, spleen, kidney) should be considered both for the detection of genetic material (RT-PCR) and for histopathological and immunohistochemical study. Taking biopsies in a patient with suspected dengue is completely contraindicated.

Finally, it is important to have a clear laboratory algorithm that allows early detection. Although multiple molecular methodologies (multiplex PCR) are useful when there is no clear clinical suspicion, when faced with a case of dengue that meets the established definitions and where the symptoms are compatible, it is suggested to prioritize protocols for specific detection (singleplex) of the virus *(8)*.

Since laboratory services are a key component of dengue epidemiological surveillance, in countries with simultaneous dengue and COVID-19 outbreaks, dengue virus detection and characterization should be maintained.

Case management

Measures to ensure proper clinical management of suspected dengue cases should be a priority.

Capacities must be strengthened at the primary health care level. Health workers should focus on early clinical diagnosis and recognition of serious warning signs in dengue (such as severe and sustained abdominal pain or tenderness of the abdomen, persistent vomiting, clinical fluid accumulation, mucosal bleeding, lethargy, restlessness, liver enlargement > 2 cm below the costal margin, and progressive increase in hematocrit). In cases where dengue is suspected, healthcare workers should provide clear guidance to patients and/or families to monitor for warning signs and seek immediate medical attention should they occur. These measures will help prevent the progression of the disease to severe dengue and deaths, which in turn will also help reduce the number of patients that need to be referred to hospitals, thus avoiding the saturation of these facilities and intensive care units.

At the same time, all second and third level hospitals must be prepared to handle serious cases of dengue.

More information on the clinical management of dengue cases is available in the Guidelines for the clinical diagnosis and treatment of dengue, chikungunya, and Zika[7] and in the Tool for the diagnosis and care of patients with suspected arboviral diseases[8], both published by PAHO.

PAHO reiterates the recommendations for technical teams in charge of malaria control, as those also apply to personnel involved in arboviruses care and are available at: https://bit.ly/2UymiMy *(9)*.

Community involvement

Every effort should be made to gain community support for the prevention of dengue.

Simple Information, Education and Communication (IEC) materials can be disseminated through various media (including social media).

Household members should be encouraged to eliminate both residential and peri-domiciliary sources of mosquito breeding.

Highly productive mosquito breeding sites, such as water storage containers (drums, elevated tanks, clay pots, etc.) must be subject to preventive measures to avoid vector reproduction. Other breeding sites, such as roof gutters and other water-holding containers, should also be cleaned periodically.

Local teams often know how to convey this information more effectively, and in many cases national campaigns and messages are not as effective as local awareness initiatives.

***Aedes* prevention and control measures**

PAHO/WHO urges Member States to make effective use of available resources to prevent and/or control vector infestation in affected areas and in health care services. This may be achieved through the implementation of integrated vector control strategies in emergencies, which include the following processes:

- Selection of control methods based on knowledge of vector biology, disease transmission, and morbidity.
- Use of multiple interventions, often in combination and synergistically.
- Collaboration of the health care sector with public and private sectors linked to environmental management whose work impacts the reduction of the vector.
- Integration of individuals, families, and other key partners (education, finance, tourism, water and sanitation, and others) in prevention and control activities.
- Strengthening of the legal framework permitting an integrated and intersectoral approach.

Given the high infestation by *Aedes aegypti* and the presence of *Ae. albopictus* in the Region, PAHO/WHO recommends that prevention and control measures aim to reduce the density of the

[7] Pan American Health Organization. Guidelines for the clinical diagnosis and treatment of dengue, chikungunya, and Zika. Washington, DC. PAHO; 2022. Available from: https://iris.paho.org/handle/10665.2/55867
[8] Pan American Health Organization. Tool for the diagnosis and care of patients with suspected arboviral diseases. Washington, DC. PAHO; 2017. Available from: https://iris.paho.org/handle/10665.2/33895

vector and have the acceptance and collaboration of local populations. Prevention and control measures for implementation by national authorities should include the following:

- Strengthen environmental management actions, primarily the elimination of vector breeding sites in households and in common areas (parks, schools, cemeteries, etc.).

- Reorganize solid waste collection services to support breeding site elimination actions in areas of greatest transmission and, if necessary, plan intensive actions in specific areas where regular garbage collection has been interrupted.

- Apply measures for the control of breeding sites using physical, biological and/or chemical methods, while actively involving individuals, families, and the community.

- Define the high-risk transmission areas (risk stratification) and prioritize those with high concentrations of people (schools, terminals, hospitals, health care centers, etc.). In these facilities, the presence of mosquitoes must be eliminated in a diameter of at least 400 meters. It is important to pay special attention to health care units, and to assure that these are free of the presence of the vector and its breeding sites so that they do not become spreading sources of the virus.

- In areas where active transmission is detected, implementing measures aimed to eliminate infected adult mosquitoes (primarily using insecticides) is suggested in order to stop and cut transmission. This action is of an exceptional nature and is only effective when it is conducted by well-trained personnel under internationally accepted technical guidelines; and when it is carried out simultaneously with the other proposed actions. The main action to interrupt intensive transmission is the elimination of infested adult mosquitoes (active transmission) through indoor spraying by using individual equipment added to the destruction and/or control of vector breeding sites within households.

- An effective modality of adult control that can be used, considering the available operational capacities, is indoor residual spraying, which should be applied selectively to the resting areas of *Aedes aegypti*, avoiding the contamination of storage containers of water used for drinking or cooking purposes. This intervention performed in treated areas is effective for a period of up to four-months; it can be used in shelters, homes, health care services, schools, and others. For more information, consult the PAHO Manual for Indoor Residual Spraying in Urban Areas for *Aedes aegypti* Control[9] and the document on Control of *Aedes aegypti* in the scenario of simultaneous transmission of COVID-19[10].

- Correctly choose the insecticide to be used (following PAHO/WHO recommendations), its formulation, and be aware of which mosquito populations are susceptible to the chosen insecticide.

- Guarantee the proper functioning of fumigation equipment and its maintenance and ensure insecticide reserves.

[9] Pan American Health Organization. Manual for Indoor Residual Spraying in Urban Areas for *Aedes aegypti* Control. Washington, DC: PAHO; 2019. Available from: https://iris.paho.org/handle/10665.2/51637
[10] Pan American Health Organization. Control of *Aedes aegypti* in the scenario of simultaneous transmission of COVID-19. Washington, DC: PAHO; 2020. Available from: https://www.paho.org/en/documents/control-aedes-aegypti-scenario-simultaneous-transmission-covid-19

- Intensify actions of supervision of the operators' field work (quality control), during the focal treatment and in the adulticide treatment (fumigation), ensuring compliance with personal protection measures.

Personal preventive measures

Patients infected with dengue, chikungunya, and/or Zika virus are the reservoir of infection for others in their households and in the community. It is necessary to communicate to the sick, their families, and the affected community about the risk of transmission and ways to prevent contagion by decreasing the vector population and the contact between the vector and people.

To minimize vector-patient contact it is recommended:

- Patients should rest under mosquito nets, impregnated, or not, with insecticide.
- Patients, as well as other household members, must wear long sleeves (if there are sick people in the house) to cover the extremities.
- Repellents containing DEET, IR3535, or Icaridine can be applied to exposed skin or clothing, and must be used in strict accordance with the instructions on the product label.
- Use wire-mesh/mosquito nets on doors and windows.

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8. Pan American Health Organization. Recommendations for laboratory detection and diagnosis of arbovirus infections in the Region of the Americas. Washington, DC: PAHO; 2022. Available in Spanish from: https://iris.paho.org/handle/10665.2/56321

9. Pan American Health Organization. Measures to ensure the continuity of the response to malaria in the Americas during the COVID-19 pandemic, 24 April 2020. Washington, DC: PAHO; 2020. Available from: https://bit.ly/2UymiMy

Additional resources

- Pan American Health Organization. Methodology for evaluating national arboviral disease prevention and control strategies in the Americas. Washington, DC. PAHO; 2021. Available from: https://iris.paho.org/handle/10665.2/55745.

- Pan American Health Organization. Guidelines for the clinical diagnosis and treatment of dengue, chikungunya, and Zika. Washington, DC. PAHO; 2022. Available from: https://iris.paho.org/handle/10665.2/55867.

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